Update on Avian Bornavirus
And Proventricular Dilatation Disease

This article summarizes a lecture on PDD given by Dr. Susan Clubb at the 2010 AAV Meeting

Background:

Proventricular Dilatation Disease (PDD) has been recognized since 1970 and was originally called Macaw Wasting Disease. It is one of the most devastating and least understood infectious diseases that affect our pet birds.

To date, PDD has been recognized in over 70 different psittacine species as well as other pet species including canaries, Green finches, and toucans. Interestingly, PDD has not been diagnosed in budgerigars, suggesting they may be resistant to the disease.

Transmission:

PDD spreads slowly but spread speeds up in crowded situations such as aviaries and nurseries. Both male and female birds are equally affected and the disease strikes adults and birds as young as 5 weeks of age. PDD has not been recognized in free ranging birds thus far.

Cause:

After 30 years of looking for a causative agent for PDD, a distinct bornavirus, named Avian Bornavirus (ABV), was discovered using advanced molecular tools. Prior to discovery of ABV, the only other bornavirus, BDV, was recognized as causing an encephalitic disease in horses and sheep.

The avian bornavirus appears to be consistently present in PDD positive birds and since the first discovery of this virus, several independent studies have reported detecting ABV in PDD positive birds from four different continents.

ABV has been recovered from at least 28 psittacine species and one canary - all of which were showing classic PDD symptoms.

While it is clear that ABV can cause PDD, the possibility cannot be ruled out that another unknown virus may be able to cause a similar disease syndrome. Also, birds can have ABV but have no obvious signs of infection, acting as carriers and possibly shedding the virus over the
long term, playing a significant role in the spread of PDD.

**Pathology:**

The route of exposure is believed to be fecal to oral, meaning the disease is transmitted through the droppings.

Classic PDD clinical signs include emaciation, muscle wasting, and dilation of the proventriculus and ventriculus. The lack of these findings does not rule out PDD. Some birds have the disease confined to the central nervous system, while in others death is by heart failure, by severe seizure disorders, or by abnormalities in the adrenal gland.

Microscopic lesions can be seen in the GI tract, the nervous system, heart, and adrenal glands, as well as the eye and skin. When the virus affects the nerves, the result is poor function of the organs that they supply. When the organ fails, and the body's inflammatory immune response kicks in, the clinical signs ensue.

**Clinical Signs of PDD:**

In the classic form of PDD, it is primarily the gastrointestinal tract that is affected and the signs include weight loss, wasting, vomiting or regurgitation and the presence of undigested food in the droppings. In the CNS form, the bird can show instability, poor coordination, falling off the perch (especially at night), seizures, abnormal head movements or blindness. Signs may be unilateral, mimicking a stroke. These signs are often difficult to pick up in a young, weaning bird that is naturally clumsy. Some birds have both the GI and the CNS clinical signs and often, on post mortem, lesions are discovered in both locations regardless of the clinical presentation.

The incubation period of the disease is extremely variable. In experiments, infection takes a minimum of 11 days and can take up to a month before signs are exhibited, but the maximum period is more likely years. It is also known that a bird with biopsy lesions consistent with PDD, a positive test for ABV, or both a positive biopsy and a positive ABV test can still appear clinically normal.

**Diagnosis:**

The gold standard for diagnosing PDD is microscopic examination (histopathology) - typically of the crop. The sensitivity of this test in PDD positive birds has been documented as being anywhere from 22- 76% accurate. Thus, a negative biopsy does not necessarily mean the bird is not PDD positive.
Diagnostic imaging has been used to help diagnose PDD. Survey radiographs can identify a dilated proventriculus or ventriculus and contrast studies or active imaging such as fluoroscopy or ultrasound can be helpful, but these tests do not definitively rule in or rule out a diagnosis of PDD.

With the discovery of ABV, the potential for laboratory testing became available, but it is essential to understand that at this time, the detection of the virus or the detection of antibodies to the virus only means that the virus has been detected or that the bird has been exposed to the virus and developed antibodies - it does not equal a diagnosis of PDD.

We also know that ABV can be shed intermittently, so failure to find the virus on choanal/cloacal swabs, or in the feces, is not a definitive negative.

Although the new viral testing holds the greatest potential for screening large collections of birds for PDD, to date there are apparent false positives and false negatives.

**Summary:**

So where does that leave the pet bird owner? This is a devastating disease - both for birds and their owners. There is a social stigma that is associated with PDD and owners often must decide between euthanasia and long term management of clinically affected birds.

However, now that we have a test, we need to figure out which birds to test, when to test and what to do with the results of the test.

**So here are the facts:**

- A bird that has PDD will have ABV.
- Not all birds that have ABV will get PDD.
- A negative swab or fecal test for ABV does not mean the bird does not have ABV; it may only mean the bird is not shedding the virus at the time of testing.
- A positive blood test for antibody or antigen in a bird that is clinically normal only confirms that the bird has been exposed to ABV.
- It is unknown at this time if ABV is the only virus associated with PDD.
- Birds treated for PDD may act as carriers of the ABV and continue to shed the virus after treatment.
- Birds with no clinical signs of PDD may be carriers of ABV and may shed the virus intermittently.
The gold standard for testing for PDD still remains the biopsy.

As with any newly available test, our inclination as bird owners is to 'flock' to that test to proactively address a potential problem in our birds. Certainly, any bird clinically sick with suspect PDD should be tested, as should all other birds in the household or birds that have been exposed to the ailing bird.

In all other cases, it is best to work with your avian veterinarian to decide whether testing is appropriate and remember that interpretation of the test results is paramount. Do not get a false sense of security because of a negative swab and do not assume a death sentence with a positive blood test. In the meantime, practice safe bird habits. Avoid congregations of birds; test any bird prior to bringing it into your household or aviary and quarantine new arrivals. Always practice good hygiene.

The discovery of Avian Bornavirus represents the cutting edge of avian medicine. As we learn more about the virus, its relationship to Proventricular Dilatation Disease, and how we can best help our avian patients, rest assured that that information will be quickly made available to all bird owners.

Respectfully submitted:

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